

Landslides

Given the mountainous nature of most of the state, landslides are a common occurrence in West Virginia. A 1996 West Virginia Geological and Economic Survey (WVGES) study estimated that there are nearly 500,000 landslides in the state, and damage estimates are about \$30 million annually (Lessing, 1996). West Virginia accounts for 13 percent of U.S. landslide damage and is ranked one of the top two states in Highest Landslide Damage Per Capita values at \$100-300 /person/year (Kite, 2003).

Landslides are characterized by the downward and outward movement of slope-forming materials reacting under the force of gravity. Landslides can include mudflows, mudslides, debris flows, rock falls, rockslides, debris avalanches, debris slides, and earth flows. The type of movement and type of material in motion generally classify the landslides. Types of movement include: slides, flows, lateral spreads, and falls and topples. The types of materials in motion are generally bedrock and soils. A combination of two or more of the principal flow types is referred to as a complex movement.

Hazard Terminology

Landslide – Downward movement of a slope and materials under the force of gravity.

Falls – The abrupt movements of materials that become detached from steep slopes or cliffs, moving by free-fall, bouncing, and rolling.

Topple – A block of rock that tilts or rotates forward and falls, bounces, or rolls down the slope.

Lateral Spreads – Develop on gentle slopes and entail the sidelong movement of large masses of soil as an underlying layer liquefies in a seismic event.

Debris Flow – A rapid mass movement in which loose soils, rocks, and organic matter combine with entrained air and water to form slurry that then flows down slope, usually associated with steep gullies.

Geologic, physiographic, and climatic factors affect the nature and occurrence of landslides in West Virginia. Geology and physiographic factors can affect the incidence of landslides via the degree of slope and consolidation of soils. Steeper areas are more susceptible to landslides, as are areas where constituent soils are loosely consolidated.

One climatic condition responsible for increased landslide occurrence in West Virginia is the high average annual rainfall, which results in increased soil saturation and increased snowmelt in winter. Higher degrees of soil saturation cause weaker soil cohesiveness and change slope angles. Other factors that may also contribute to the occurrence of landslides include: seismic activity (uncommon in West Virginia), elevated water tables, and other variables that increase surface runoff (e.g., wildfires, construction of paved surfaces), thereby causing increased localized erosion.

According to the United States Geologic Survey, practically all of West Virginia resides in a zone of high incidence of landslides. As such, landslides pose a significant threat to the lives and property of West Virginia's residents.

In November 1985, extended rainstorms in West Virginia (and neighboring Virginia) caused debris flows (and flooding) in the Potomac and Cheat river basins that were responsible for 70 deaths and \$1.3 billion in damage to homes, businesses, roads, and farmlands (Gori and Burton, 1996).

From the West Virginia All Hazard Mitigation Plan, West Virginia Office of Emergency Services